

# Claims

- [c1] 1. A method for noninvasive ECG detection and diagnosis, comprising the following steps:
  - .acquiring high-resolution ECG data from a patient;
  - processing said acquired data in accordance with two or more different ECG analysis algorithms; and
  - deriving a prediction score for a particular clinical end point as a function of the respective results of said two or more ECG analysis algorithms.
- [c2] 2. The method as recited in claim 1, further comprising the step of training a predictive model with clinically confirmed data for both input and output, wherein said predictive model is used for said prediction score derivation.
- [c3] 3. The method as recited in claim 1, wherein said particular clinical end point is sudden cardiac death.
- [c4] 4. The method as recited in claim 1, wherein said particular clinical end point is sustained ventricular tachycardia.
- [c5] 5. The method as recited in claim 1, wherein said particular clinical end point is ischemia.

- [c6] 6. The method as recited in claim 1, wherein said ECG analysis algorithms comprise late potential, T wave alternans and QT dynamicity algorithms.
- [c7] 7. The method as recited in claim 1, wherein said ECG analysis algorithms comprise QT dispersion and intra-QRS algorithms.
- [c8] 8. The method as recited in claim 1, wherein said ECG analysis algorithms comprise heart rate variability, QT dispersion and QT dynamicity algorithms.
- [c9] 9. The method as recited in claim 1, wherein said data acquisition step uses the X, Y and Z leads of a Frank lead system.
- [c10] 10. The method as recited in claim 9, wherein one of said ECG analysis algorithms is a T wave alternans algorithm comprising the following steps:  
dividing the high-resolution ECG data into even beat and odd beat groups;  
averaging beats in said even and odd beat groups separately;  
determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;  
determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads; and

determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads.

[c11] 11. The method as recited in claim 9, wherein said data acquisition step also uses leads of a standard 12-lead system.

[c12] 12. The method as recited in claim 11, wherein one of said ECG analysis algorithms is a QT dispersion algorithm comprising the following steps:  
computing a respective QT dispersion value for each of a multiplicity of successive segments of 12-lead ECGs; and  
computing an mean or median value of said QT dispersion values.

[c13] 13. A system for noninvasive ECG detection and diagnosis, comprising: a multiplicity of electrodes applied to a patient, a data acquisition system for acquiring high-resolution ECG data from the patient; and a processor programmed to process said acquired data in accordance with two or more different ECG analysis algorithms, and derive a prediction score for a particular clinical end point as a function of the respective results of said two or more ECG analysis algorithms.

[c14] 14. The system as recited in claim 13, wherein said pro-

cessor is programmed to use a predictive model for said prediction score derivation, said predictive model being trained with clinically confirmed data for both input and output.

- [c15] 15. The system as recited in claim 13, wherein said particular clinical end point is sudden cardiac death.
- [c16] 16. The system as recited in claim 13, wherein said particular clinical end point is sustained ventricular tachycardia.
- [c17] 17. The system as recited in claim 13, wherein said particular clinical end point is ischemia.
- [c18] 18. The system as recited in claim 13, wherein said ECG analysis algorithms comprise late potential, T wave alternans and QT dynamicity algorithms.
- [c19] 19. The system as recited in claim 13, wherein said ECG analysis algorithms comprise QT dispersion and intra-QRS algorithms.
- [c20] 20. The system as recited in claim 13, wherein said ECG analysis algorithms comprise heart rate variability, QT dispersion and QT dynamicity algorithms.
- [c21] 21. The system as recited in claim 13, wherein said data acquisition system comprises the X, Y and Z leads of a

Frank lead system.

- [c22] 22. The system as recited in claim 21, wherein one of said ECG analysis algorithms executed by said processor is a T wave alternans algorithm comprising the following steps:
- dividing the high-resolution ECG data into even beat and odd beat groups;
  - averaging beats in said even and odd beat groups separately;
  - determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;
  - determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads; and
  - determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads.
- [c23] 23. The system as recited in claim 21, wherein said data acquisition system further comprises leads of a standard 12-lead system applied to the patient.
- [c24] 24. The system as recited in claim 23, wherein one of said ECG analysis algorithms executed by said processor is a QT dispersion algorithm comprising the following steps:
- computing a respective QT dispersion value for each of a

multiplicity of successive segments of 12-lead ECGs; and computing an mean or median value of said QT dispersion values.

[c25] 25. A method for noninvasive ECG detection and diagnosis, comprising the following steps:

- (a) acquiring high-resolution ECG data from a patient using the X, Y and Z leads of a Frank lead system;
- (b) dividing the high-resolution ECG data into even beat and odd beat groups;
- (c) averaging beats in said even and odd beat groups separately;
- (d) determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;
- (e) determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads;
- (f) determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads; and
- (g) determining T wave alternans as a function of the results of steps (d)–(f) by analysis of variance.

[c26] 26. A system for noninvasive ECG detection and diagnosis, comprising: a multiplicity of electrodes applied to a patient, a data acquisition system for acquiring high-resolution ECG data from the patient using the X, Y and Z leads of a Frank lead system; and a processor pro-

grammed to process said acquired data in accordance with a T wave alternans algorithm comprising the following steps:

- (a) dividing the high-resolution ECG data into even beat and odd beat groups;
- (b) averaging beats in said even and odd beat groups separately;
- (c) determining the variance of T wave morphology of all even beats for each of said X, Y, Z leads;
- (d) determining the variance of T wave morphology of all odd beats for each of said X, Y, Z leads;
- (e) determining the variance of T wave morphology between even and odd averaged beats for each of said X, Y, Z leads; and
- (f) determining T wave alternans as a function of the results of steps (c)–(e) by analysis of variance.